

IN THE CLAIMS

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1. (Currently Amended) A pipetting apparatus comprising:

a pipette having a nozzle;

pipette holding means for holding said pipette;

a piston fluid-tightly sliding along an inner wall of said pipette, an inner space defined by said pipette and said piston being directly coupled to said nozzle;

piston holding means for holding a portion of said piston; and

position changing means including an actuator for changing a position of said piston with said piston holding means to suck a liquid into said pipette at a first speed and for changing said position of said piston with said piston holding means by a short distance with respect to said pipette holding means at a second speed higher than said first speed in response to a high speed signal to jet a portion of a said liquid in said pipette through said nozzle as a drop, wherein said short distance is determined in accordance with a desired amount of said jetted portion of said liquid.

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2. (Previously Amended) A pipetting apparatus as claimed in claim 1, wherein said actuator comprises a motor, said pipetting apparatus further comprises another position changing means including said motor for changing said position of said piston with said motor in response to a low speed signal to suck and discharge a desired amount of said liquid, and said motor is commonly used between said position changing means and said another position changing means.

3. (Currently Amended) A pipetting apparatus as claimed in claim 1, wherein said instantaneous position changing means comprises a piezoelectric actuator.

4. (Original) A pipetting apparatus as claimed in claim 1, further comprising an attachable nozzle cap being attachable to said pipette and having a nozzle-cap nozzle for jetting said portion of said liquid through said nozzle and said nozzle-cap nozzle, a diameter of said nozzle-cap nozzle being smaller than that of said nozzle.

5. (Currently Amended) A pipetting apparatus as claimed in claim 1, further comprises; detection means for detecting said portion of said liquid jetted from said pipette; and confirming means in response to said instantaneous position changing means and said detection means for confirming that said portion of said liquid is jetted and outputting a confirmed result.

Claims 6-13 (Cancelled)

14. (New) A pipetting apparatus as claimed in claim 1, wherein said liquid is sucked into said inner space defined by said pipette and said piston in accordance with said position of said piston.

15. (New) A pipetting apparatus as claimed in claim 1, wherein a position at which said piston fluid-tightly slides along said inner wall of said pipette is movable to said pipette along said inner surface.

16. (New) A pipetting apparatus as claimed in claim 1, wherein said first speed is sufficiently low to prevent the air from entering said inner space through a space which would be made between said piston and said inner wall of said pipette while said liquid is sucked into said pipette.

17. (New) A pipetting apparatus as claimed in claim 1, further comprising supporting means for supporting said pipette holding means, said piston holding means, and said position changing means.

18. (New) A pipetting apparatus as claimed in claim 17, wherein said supporting means is capable of being hand-held.

19. (New) A pipetting apparatus as claimed in claim 17, wherein said supporting means is capable of being hand-held by a robot arm.

20. (New) A pipetting apparatus as claimed in claim 1, wherein said pipette is replaceable with said pipette holding means, and said piston is replaceable with said piston holding means.

21. (New) A pipetting apparatus comprising:
a pipette having a nozzle;
pipette holding means for holding said pipette;

a piston fluid-tightly sliding along an inner wall of said pipette, an inner space defined by said pipette and said piston being directly coupled to said nozzle;

piston holding means for holding a portion of said piston; and

position changing means including a linear pulse motor for changing a position of said piston with said piston holding means in response to a pulse signal at a first pulse rate to suck said liquid into said pipette and for changing said position of said piston with said piston holding means by a short distance with respect to said pipette holding means in response to said pulse signal at a second pulse rate to jet a portion of a liquid in said pipette through said nozzle as a drop, wherein

said second pulse rate is higher than said first rate, and wherein said short distance is determined in accordance with a desired amount of said jetted portion of said liquid.

22. (New) A pipetting apparatus as claimed in claim 21, further comprising an attachable nozzle cap being attachable to said pipette and having a nozzle-cap nozzle for jetting said portion of said liquid through said nozzle and said nozzle-cap nozzle, a diameter of said nozzle-cap nozzle being smaller than that of said nozzle.

23. (New) A pipetting apparatus as claimed in claim 21, further comprises;

detection means for detecting said portion of said liquid jetted from said pipette; and

confirming means in response to said position changing means and said detection means for confirming that said portion of said liquid is jetted and outputting a confirmed result.

24. (New) A pipetting apparatus as claimed in claim 21, wherein said liquid is sucked into said inner space defined by said pipette and said piston in accordance with said position of said piston.

25. (New) A pipetting apparatus as claimed in claim 21, wherein a position that said piston fluid-tightly slides along said inner wall of said pipette is movable to said pipette along said inner surface.

26. (New) A pipetting apparatus as claimed in claim 21, wherein said first speed is sufficiently low to prevent the air from entering said inner space through a space between said piston and said inner wall of said pipette while said liquid is sucked into said pipette.

27. (New) A pipetting apparatus as claimed in claim 21, further comprising supporting means for supporting said pipette holding means, said piston holding means, and said position changing means.

28. (New) A pipetting apparatus as claimed in claim 21, wherein said supporting means is capable of being hand-held.

29. (New) A pipetting apparatus as claimed in claim 21, wherein said supporting means is capable of being hand-held by a robot arm.

30. (New) A pipetting apparatus as claimed in claim 21, wherein said pipette is replaceable with said pipette holding means, and said piston is replaceable with said piston holding means.

31. (New) A pipetting apparatus comprising:
a pipette having a nozzle;
pipette holding means for holding said pipette;
a piston fluid-tightly sliding along an inner wall of said pipette;
piston holding means for holding a portion of said piston; and
position changing means including a motor for changing a position of said piston with said piston holding means in response to a control signal to suck said liquid into said pipette; and
a piezoelectric actuator for changing said position of said piston with said piston holding means by a short distance with respect to said pipette holding means in response to said a piezoelectric actuator control signal to jet a portion of a liquid in said pipette through said nozzle as a drop, wherein

said short distance is determined in accordance with an amount of said jetted portion of said liquid

32. (New) A pipetting apparatus as claimed in claim 31, further comprising an attachable nozzle cap being attachable to said pipette and having a nozzle-cap nozzle for jetting said portion of said liquid through said nozzle and said nozzle-cap nozzle, a diameter of said nozzle-cap nozzle being smaller than that of said nozzle.

33. (New) A pipetting apparatus as claimed in claim 31, further comprises; detection means for detecting said portion of said liquid jetted from said pipette; and confirming means in response to said position changing means and said detection means for confirming that said portion of said liquid is jetted and outputting a confirmed result.

34. (New) A pipetting apparatus as claimed in claim 31, wherein said liquid is sucked into said inner space defined by said pipette and said piston in accordance with said position of said piston.

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35. (New) A pipetting apparatus as claimed in claim 31, wherein a position that said piston fluid-tightly slides along said inner wall of said pipette is movable to said pipette along said inner surface.

36. (New) A pipetting apparatus as claimed in claim 31, wherein said first speed is sufficiently low to prevent the air from entering said inner space through a space between said piston and said inner wall of said pipette while said liquid is sucked into said pipette.

37. (New) A pipetting apparatus as claimed in claim 31, further comprising supporting means for supporting said pipette holding means, said piston holding means, and said position changing means.

38. (New) A pipetting apparatus as claimed in claim 37, wherein said supporting means is capable of being hand-held.

39. (New) A pipetting apparatus as claimed in claim 37, wherein said supporting means is capable of being hand-held by a robot arm.

40. (New) A pipetting apparatus as claimed in claim 31, wherein said pipette is replaceable with said pipette holding means, and said piston is replaceable with said piston holding means.

41. (New) A pipetting apparatus as claimed in claim 31, wherein said motor controls the surface of said liquid in the nozzle after said piezoelectric actuator changes said position of said piston jets a portion of a liquid in said pipette through said nozzle.

42. (New) A method of pipetting a liquid with a pipetting apparatus comprising:
a pipette having a nozzle;
pipette holding means for holding said pipette;
a piston fluid-tightly sliding along an inner wall of said pipette, an inner space defined by said pipette and said piston being directly coupled to said nozzle;
piston holding means for holding a portion of said piston;
position changing means including an actuator for changing a position of said piston with said piston holding means to suck a liquid into said pipette at a first speed and for changing said position of said piston with said piston holding means by a short distance with respect to said pipette holding means at a second speed higher than said first speed to jet a portion of said liquid in said pipette through said nozzle as a drop; and

an attachable nozzle cap being attachable to said pipette and having a nozzle-cap nozzle for jetting said portion of said liquid through said nozzle and said nozzle-cap nozzle, a diameter of said nozzle-cap nozzle being smaller than that of said nozzle, wherein said short distance is determined in accordance with a desired amount of said jetted portion of said liquid, said method comprising the steps of:

sucking said liquid into said pipette with said position changing means through said nozzle without said attachable nozzle;

attaching said attachable nozzle having a nozzle-cap nozzle to jet said portion of said liquid through said nozzle and said nozzle-cap nozzle; and

operating said position changing means to jet a portion of said liquid in said pipette through said nozzle and nozzle-cap nozzle as a drop.

43. (New) A pipetting apparatus comprising:

a pipette having a nozzle;

pipette holding means for holding said pipette;

a piston fluid-tightly sliding along an inner wall of said pipette, an inner space defined by said pipette and said piston being directly coupled to said nozzle;

piston holding means for holding a portion of said piston; and

position changing means including an actuator for changing a position of said piston with said piston holding means to suck a liquid into said pipette at a first speed and for changing said position of said piston with said piston holding means by a short distance with respect to said pipette holding means at a second speed to jet a portion of said liquid in said pipette through said nozzle as a drop, wherein

said short distance is determined in accordance with a desired amount of said jetted portion of said liquid.

44. (New) A pipetting apparatus as claimed in claim 43, wherein

said liquid is sucked into said inner space defined by said pipette and said piston in accordance with said position of said piston,

a position at which said piston fluid-tightly slides along said inner wall of said pipette is movable to said pipette along said inner surface, and

said first speed is sufficiently low to prevent the air from entering said inner space through a space which would be made between said piston and said inner wall of said pipette while said liquid is sucked into said pipette,

said pipetting apparatus further comprising:

supporting means for supporting said pipette holding means, said piston holding means, and said position changing means, wherein

said supporting means is capable of being hand-held, wherein said pipette is replaceable with said pipette holding means, and said piston is replaceable with said piston holding means.